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PALLODES AUSTRINUS, A NEW SPECIES OF NITIDULIDAE (NITIDULINAE) WITH DISCUSSIONS ON *PALLODES* MYCOPHAGY

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Abstract.—*Pallodes austrinus* is described as new and illustrated. *Pallodes pallidus* is also illustrated and differences of both species are discussed. *Pallodes* adult and larval mandibles are adapted for mycophagy with cutting spines on the incisor edges, a well developed prostheca and an asperate mola. *Pallodes pallidus* has a wider mushroom host range than *P. austrinus* but with large overlap.

Pallodes species are commonly found on fresh mushrooms. Although diverse in the tropics only two species are known from North America: *Pallodes plateosus* Schaeffer in the southern Rockies of Arizona and New Mexico and *Pallodes pallidus* Beauvois in eastern temperate forests (Parsons, 1943). Parsons (1943) designated *P. pallidus* as the genotype.

During a recent survey of mycophagous Coleoptera, specimens of *P. pallidus* and a new species of *Pallodes* were collected from fresh mushrooms. Mixtures of both species were found in loaned material. Detailed examination of specimens revealed that Parsons (1943) had unknowingly described and illustrated both species as *P. pallidus.*

Lawrence (1988a) stated that most larval nitidulids have retracted mouthparts that are pushed forward by the longitudinal cardines and that the prostheca is complex. In addition, the adult nitiduline mandible is equally impressive as the larval nitiduline mandible.

The objectives of this paper are: 1) to clarify the identity of the two Eastern species of *Pallodes* including a description of the new species, and 2) to describe *Pallodes* larval and adult mouth parts. Information on mushroom hosts and seasonal abundance is also provided.

METHODS

Specimens were borrowed from the following institutions: Florida State Arthropod Collections (FSAC), North Carolina State University Entomology collection (NCEC) and the National Museum of Natural History (USNM). Additional specimens were supplied by Karl Stephan (KSC). Paratypes were sent to the above and to the British Museum (Natural History) (BMNH), Canadian National Collection (CNC), Museum de'Histoire naturelle, Geneva (MHNG), Ohio State University Collection (OSUC), and the Snow Entomological Museum, University of Kansas (SEM). Each museum received 5 paratypes (2 male, 3 female). The holotype and allotype were deposited in the University of Arkansas Insect Collection (UAIC). Remaining paratypes are retained in the R. A. B. Leschen collection (RLC) and KSC.

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Several specimens of each *Pallodes* species were dissected in glycerin after being soaked in hot 10% KOH. Body parts and limbs were slide mounted in CMC-AF medium or prepared for scanning electron microscopy. Disarticulated specimens were stored in genitalia vials and pinned.

Terms for male genitalia follow Sharp and Muir (1912) and those for the female ovipositor follow Parsons (1943). Homologies are not attempted for genitalia.

Pallodes austrinus, new species

Description. Male. Length 3–4 mm. Color testaceus. Strongly convex and glabrous. Fine microsculpture over entire body, appearing iridescent under high magnification. Terminal article of labial palp with 2 ventro-lateral rows of pedicellate setae set in longitudinal crypts (Figs. 2E, 3C). Third antennomere one-third longer than the fourth, fourth equal to the fifth (Fig. 1G). Pronotal margin broadly lobate medially. Elytron with 9 punctate stria confused in apical fourth. Coxal lines of abdominal sternite I shallow and reaching the middle of the segment (Fig. 1I). Protibial fossorial spines separated by at least one and a half times their basal width (Fig. 1A). Mesotibia with anterior spinous row separated from tibial angle by the length of a single spine (Fig. 1C). Metatarsi with basal tarsomere about one third length of metatibia (Fig. 1F). Aedeagus with setal fans of tegmen lobe confined laterally; median strut and basal piece strongly developed (Fig. 2A). Other characters as described for the genus by Parsons (1943).

Female. Same as male. Ovipositor with minutely serrate lateral edges at apical third and first and second valvulae strongly separated ventrally (Fig. 2C).

Holotype. Male, USA, AR, Logan Co., Cove Lake, 9 mi. SW of Paris, 3 June 1986, Ex *Russula,* R. A. B. Leschen (UAIC).

Allotype. USA, AR, Cross Co., Village Cr. St. Park, Augell Trail, Ex *Lactarius piperatus*, R. A. B. Leschen.

Paratypes. Arkansas: Washington Co., L. Wedington 12 mi. W. of Fayetteville, R. A. B. Leschen: 13 July 1986, Ex gilled fungus (1), 8 June 1986, Ex gilled fungus (1), 25 May 1986, Ex *Russula* (19); 25 May 1986, *Laccaria laccata* (2); 25 May 1986, Ex *Amanita* (1); 8 June 1986, Ex *Lactarius* (3); 8 June 1986, Trichalomataceae (1); 8 June 1986, Ex *Amanita* (1); 8 June 1986, Ex *Russula* (28); 8 June 1986; Ex *Amanita rubescens* (16); Logan Co., Mt. Magazine, Brown Springs, R. A. B. Leschen: 1 July 1986, Ex *Boletus* (1); 18 August 1986, Ex *Boletus* (1); 3 June 1986, Ex *Russula* (3); Logan Co., Cove Lake, R. A. B. Leschen: 3 June 1986, Ex *Russula* (6); 19 August 1986, Ex *Boletus* (1); 2 July 1986, Ex *Lactarius* (1); 28 May 1986, Ex *Russula tetans* group (1); 28 May 1986, Ex *Amanita pantherina* var. *velatipes* (6); Logan Co., 23 mi. SW of Paris off HWY 309 on National Forest Maintained Rd., 23 June 1986, Ex *Amanita rubescens,* R. A. B. Leschen (7); 17 August 1986, Ex *Amanita spreta* R. A. B. Leschen: Logan Co., Mt. Magazine, Signal Hill Trail, 1 July 1986, Ex *Boletus,* R. A. B. Leschen; Oklahoma, Latimer Co., 5 mi. SW of Red Oak, K. Stephan: 7-V-77(5); 11-1x-77(2); 11-VI-77(2); 21-VIII-77(1); Oct. 1980 (1), Aug. 1986(3); V-1983(8); VI-1983(2); VI-1984(6); IX-1984(2); V-1985(12); VII-1987(1); VI-1987(3); X-1987(3); VI-1986(6); V-1986(9); V-1987(3); IX-1986(4); X-1986(1); I-1986(1); X-1983(1); VI-1985(2); IX-1985(1); Tenn., Grundy Co., Savage Gulf St. Nat. Area, 5 mi. E of Bersheeba Spgs., 21 July 1986; Ex *Amanita,* R. A. B. Leschen (2).

Remarks. In the family treatment of Nitidulidae, Parsons (1943) did not recognize

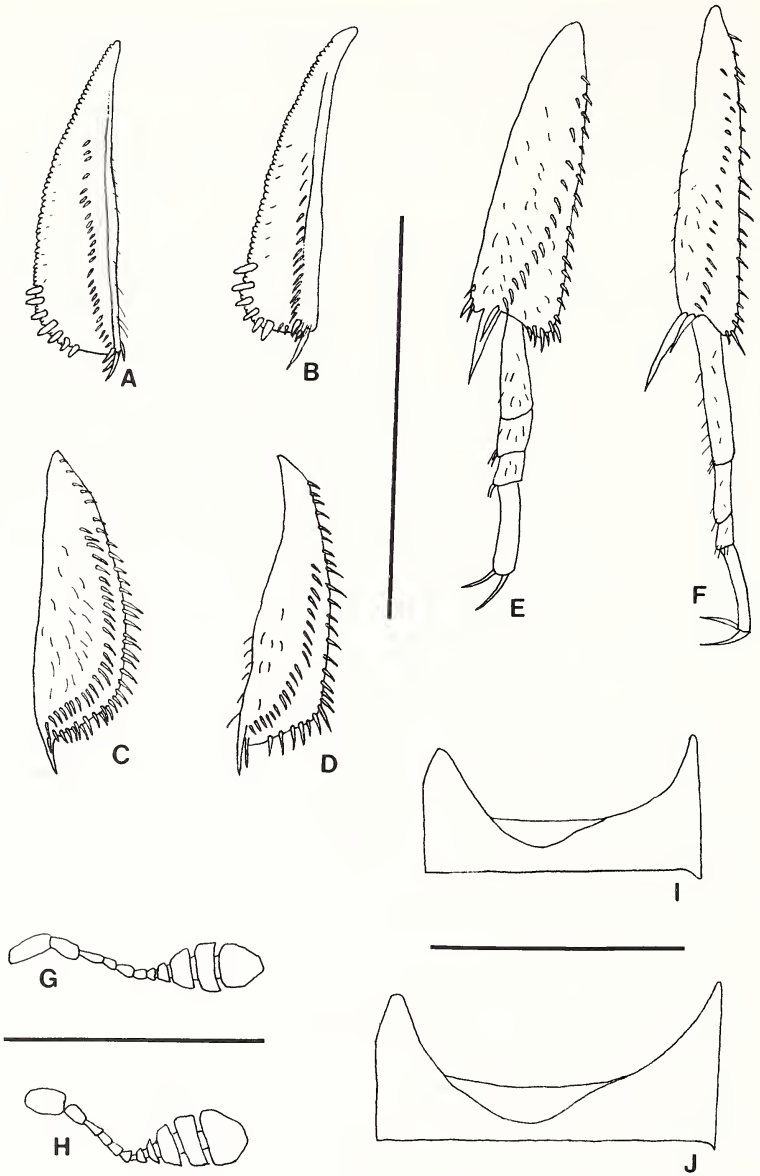

Fig. 1. *Pallodes* adult characters. A, B. Protibia, posterior aspect: A. *P. austrinus.* B. *P. pallidus.* C, D. Mesotibia, anterior aspect: C. *P. austrinus.* D. *P. pallidus.* E, F. Metatibia and metatarsa, anterior aspect: E. *P. austrinus.* F. *P. pallidus.* G, H. Antenna, ventral aspect: G. *P. austrinus.* H. *P. pallidus.* I, J. Coxal lines on right half of first abdominal ventrite. I. *P. austrinus.* J. *P. pallidus.* (Scale bar = 1 mm.)

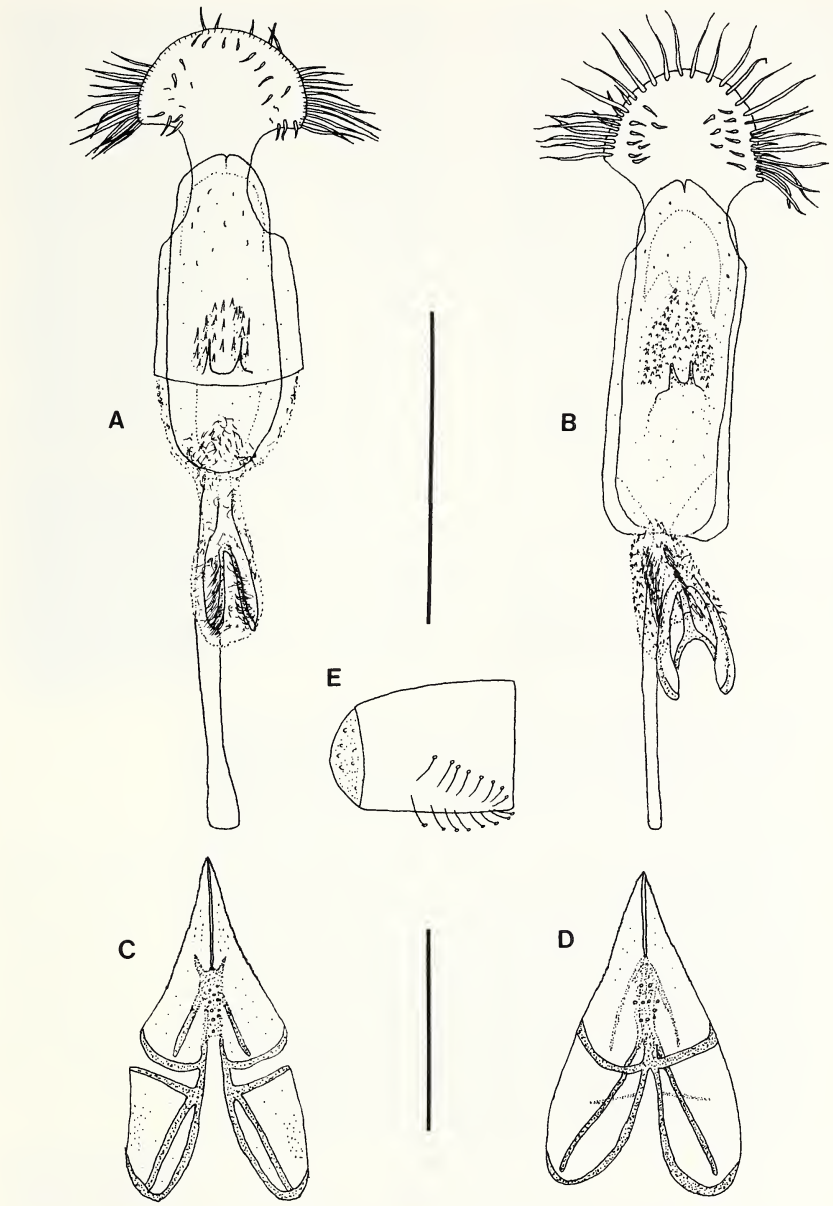

Fig. 2. Genitalia of *Pallodes*. A, B. Aedeagus: A. *P. austrinus*. B. *P. pallidus*. C, D. Ovipositer: C. *P. austrinus*. D. *P. pallidus*. E. *P. austrinus* labial palp, ventro-lateral aspect showing pedicellate sensilla. (Scale bar = 0.5 mm.)

one of the two sympatric species of *Pallodes*. He illustrated *P. pallidus* with the antenna and ovipositor of *P. pallidus,* but the aedeagus of *P. austrinus*. The mouthparts illustrated by Parsons may be of either species. *Pallodes austrinus* cannot be confused with the dorso-ventrally compressed *P. pallidus* because of its convex body form. Additionally, the more compacted funnicle antennomeres (Fig. 1G, H), the pronotal margin with posterior lobe, shallow coxal lines (Fig. 1I, J) and more compacted metatarsi will easily distinguish *P. austrinus* from *P. pallidus*. Tibial chaetotaxy (Fig. 1A–F) may also be used to distinguish *P. austrinus* from *P. pallidus*.

Both species of *Pallodes* have microsculpture but *P. pallidus* is iridescent at low magnification and *P. austrinus* is iridescent only at high magnification. Most specimens of each *Pallodes* are testaceous but may have dark elytra. Only *P. pallidus* has a large dark pronotal macula coincident with dark elytra. Variation in the depth of elytral punctate stria and spacing and number of tibial spines and setae occurs for both species of *Pallodes*.

Sexes may be determined by the eighth abdominal tergite of males. The aedeagus of *P. austrinus* has setae confined to lateral areas of the tegmen lobe and a well-developed median strut (Fig. 2A); whereas, the aedeagus of *P. pallidus* has setae along entire margin of the tegmen lobe and a thin median strut (Fig. 2B). Caution should be used when dissecting *P. pallidus* males because the fragile median strut is easily broken. The ovipositor of *P. austrinus* has the first and second valvulae separated (Fig. 2C) which is unlike most *P. pallidus* that have fused first and second valvulae (Fig. 2D). The ovipositor of one specimen of *P. pallidus* was separated although all other characters were consistent.

Distribution. Arkansas, Florida, Indiana, Louisiana, North Carolina, Oklahoma, South Carolina and Tennessee.

Etymology. Austrinus, Latin for south.

PALLODES MYCOPHAGY

Adult mouthparts. The mandible of *Pallodes* adults was illustrated by Parsons (1943). The bifid apex on the incisor process bears ventral and dorsal oblique cutting spines. The incisor process is perpendicular to the mandible proper (Fig. 3A). The outer mesal edge of the mandible is smooth with only a few short spines. The prostheca is set with large spines that are folded ventrally. Lateral and proximally entad to the prostheca is an area defined by brush-lined cavities. Just posterior to the prostheca is a well developed mola with ridges of posteriorly angled asperities. At the base of the mandible and surrounding the mola basally and laterally is a large brush. The food meatus is boarded ventrally by the maxilla with brushes and spines on the apical and inner lateral margins of the lacinea.

Larval mouthparts. The larval mandible was illustrated by Böving and Rozen (1962). The incisor process is scoop-shaped and somewhat laterally compressed, with peripheral oblique cutting spines (Fig. 3B). The well-developed prostheca is bound dorsally by a field of brushes and ventrally with minute rows of asperities. The base of the mandible consists of a large mola that has an expansive field of fine ridges of asperities dorsally and a spinous inner mesal margin that is continuous ventrally. The labial palpus has an apical brush with accessory spines. The hypopharyngeal sclerome is heavily sclerotized and the epipharynx is well-developed with posteriorly directed setae.

Larvae and adults bear slicing teeth on incisor surfaces, prosthecae for tearing,

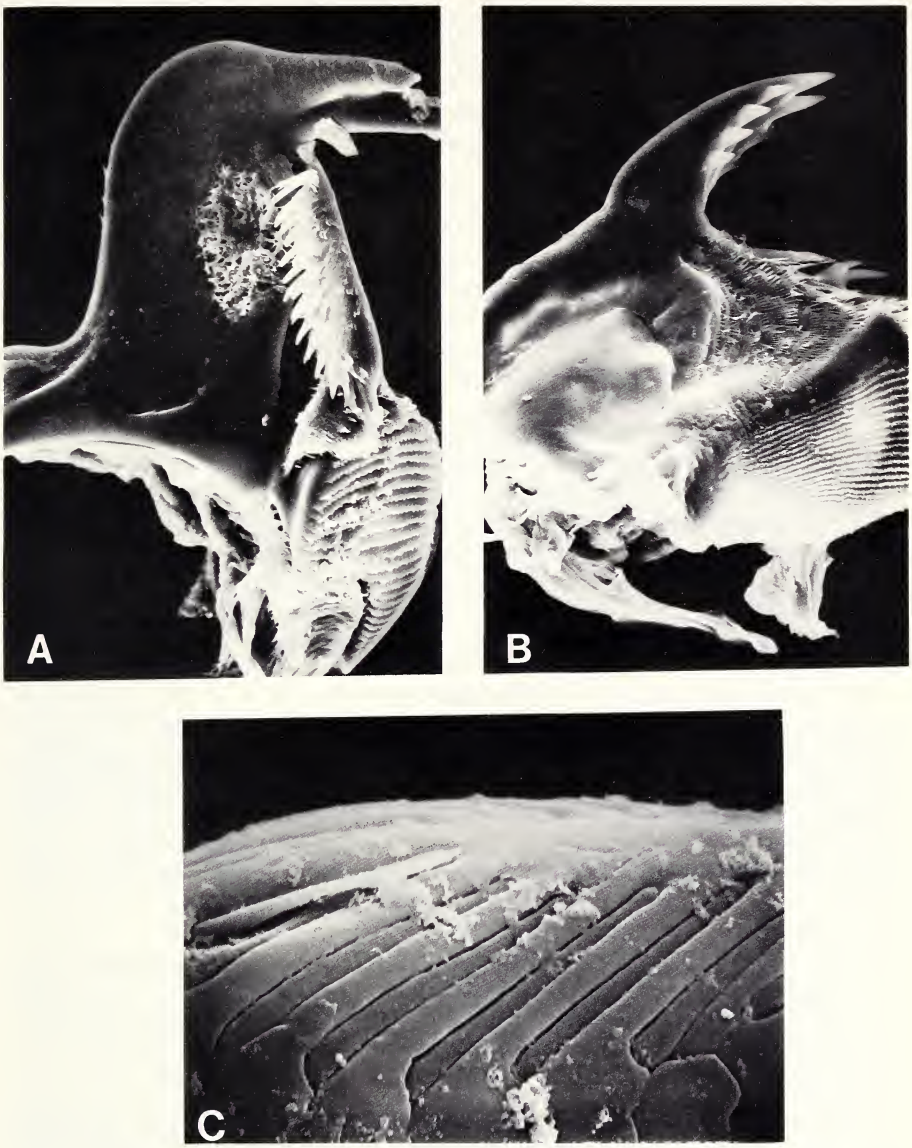

Fig. 3. Mouthparts of *Pallodes*. A. SEM micrograph of *Pallodes* adult mandible, ventral aspect. B. SEM micrograph of *Pallodes* larval mandible, dorsal view. C. SEM micrograph showing reception of pedicellate sensillae into crypts on the labial palp.

molae for grinding and compression and brushes for manipulation of the bolus. Obliquely set slicing teeth are found on various mushroom feeders (Lawrence, 1988b). Prosthecae are well developed in *Pallodes* larvae (like most Nitidulinae) and modified in the adults. The folded appearance of the adult prostheca is oriented in the same vertical plane as the cutting teeth on the bifid apex of the incisor process. The mola

may act as a press for compaction or grinding of the bolus. In the larva the mola extends onto the ventral face of the lower mandible and it may act against the hypopharyngeal sclerome. The dorsal areas of the larval mandible may act with the epipharynx to sieve excess water naturally occurring in mushroom tissue. The adult mola seems to compress the bolus vertically whereas the larva bolus is compressed horizontally.

Pallodes austrinus and *P. pallidus* have broad mushroom host ranges. *Pallodes austrinus* has a narrower host breeding range and reproduction has been confirmed on *Amanita, Boletus, Lactarius* and *Russula* whereas *P. pallidus* has been reared from *Amanita, Boletus, Laccaria, Lactarius, Pluteus, Russula* and *Strobilomyces.* Host ranges overlap and *P. austrinus* is excluded from many mushroom families that serve as hosts for *P. pallidus. Pallodes pallidus* was found most frequently on Trichalomataceae. *Pallodes austrinus* was found mostly on Russulaceae. Host patterns are similar to Ashe's (1984) pattern 1 for gyrophaenine staphylinids. A more defined host pattern may develop for *Pallodes* with the addition of future data. Host records prior to this study may be unreliable since the two species were confused.

Pallodes shows a bimodal seasonal abundance with peaks corresponding to major flushes of mushrooms and high mean monthly rainfall. *Pallodes austrinus* was most common during the months of June, August and September and *P. pallidus* was most common during the months of May, June and September. Based on rearing data and presence of teneral adults, *P. austrinus* generally reproduces in spring and early summer, and *P. pallidus* reproduces from May to September.

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